

## WHAT IS CLAIMED IS:

- 1 1. A glow plug for an internal combustion engine, comprising:
  - 2 a cylindrical housing having front and rear housing end portions, an
  - 3 inward protrusion protruding radially inwardly from the rear housing end portion,
  - 4 a threaded portion formed between the front and rear housing end portions for
  - 5 screwing the glow plug in a plug hole of the engine and a sealing portion formed
  - 6 on a front side of the threaded portion for engaging the housing with a given
  - 7 portion of the plug hole to form an airtight seal between the housing and the plug
  - 8 hole;
- 9 a sheath having a front sheath end portion projecting from the housing
- 10 and a rear sheath end portion airtightly fixed in the front housing end portion;
- 11 a heater disposed in the sheath and generating heat upon energization
- 12 thereof;
- 13 a center electrode disposed in the housing and having a front electrode
- 14 end portion, a rear electrode end portion projecting from the housing and an
- 15 outward protrusion protruding radially outwardly at a location between the front
- 16 and rear electrode end portions, the center electrode being electronically
- 17 connected at the front electrode end portion with the heater and mechanically
- 18 connected with the sheath; and
- 19 a combustion pressure sensor having a pressure-sensitive element held
- 20 between a front surface of the inward protrusion and a rear surface of the outward
- 21 protrusion to generate an electrical signal in response to variations in stress
- 22 applied thereto.

  

- 1 2. A glow plug according to Claim 1,
  - 2 the housing having a tool engaging portion formed between the rear
  - 3 housing end portion and the threaded portion to be engageable with a plug
  - 4 mounting tool, and
- 5 the outward protrusion and the pressure-sensitive element being located
- 6 radially inside the rear housing end portion.

1       3.       A glow plug according to Claim 2, wherein the pressure-sensitive  
2       element is ring-shaped and has an inner diameter smaller than an inner diameter  
3       of the tool engaging portion of the housing.

1       4.       A glow plug according to Claim 1, the further comprising:  
2               an output circuit for outputting the electrical signal from the  
3       pressure-sensitive element, the output circuit including an output electrode and a  
4       lead, the output electrode being connected to the pressure-sensitive element and  
5       having a portion protruding radially outwardly from the housing, the lead being  
6       connected to the protruding portion of the output electrode and extending axially  
7       reawardly; and  
8               a protective cover covering therein the rear housing end portion and the  
9       output circuit and having an open rear end through which the lead extends  
10      externally of the protective cover.

1       5.       A glow plug according to Claim 1, further comprising a resinous sealant  
2       to seal therein the rear housing end portion.

1       6.       A method of manufacturing a glow plug, comprising:  
2               disposing a heater in a sheath;  
3               fitting a rear end portion of the sheath into a cylindrical housing shell, the  
4       housing shell having a rear end portion formed with a sensor seat on an inner  
5       surface thereof;  
6               inserting an electrode rod into the housing shell;  
7               after said inserting, placing a first piece that defines an outward  
8       protrusion on the electrode rod, a pressure-sensitive element and a second piece  
9       that defines an inward protrusion on the housing shell, on the sensor seat of the  
10      housing shell so as to hold the pressure-sensitive element between a rear surface  
11      of the outward protrusion and a front surface of the inward protrusion;  
12               while pushing the second piece toward the front and applying

13 compressive stress to the pressure-sensitive element, fixing the second piece to the  
14 housing shell; and  
15 fixing the first piece to the electrode rod.

1 7. A method according to Claim 6, further comprising interposing an  
2 insulating member between the seat face and the outward protrusion.

1 8. A method according to Claim 6, wherein the first piece has a rear end  
2 located in a rear side of the rear end portion of the housing when placed on the  
3 sensor seat, and fixed at the rear end to the electrode rod.

1 9. A glow plug for an internal combustion engine, comprising:  
2 a cylindrical housing having a threaded portion for screwing the glow  
3 plug into a plug hole of the engine and a sealing portion formed on a front side of  
4 the threaded portion for engaging the housing with a given portion of the plug  
5 hole to form an airtight seal between the housing and the plug hole;  
6 a sheath having a front sheath end portion projecting from the housing  
7 and a rear sheath end portion airtightly fixed in the housing;  
8 a heater disposed in the sheath and generating heat upon energization  
9 thereof;  
10 a center electrode disposed in the housing and having a rear electrode end  
11 portion projecting from the housing, the center electrode being electrically  
12 connected with the heater and mechanically connected with the sheath or the  
13 sheath and the heater; and  
14 a combustion pressure sensor including a pressure-sensitive element that  
15 converts an axial displacement of the sheath or the sheath and the heater caused  
16 by a variation in combustion pressure into an electrical signal and being  
17 configured to have compressive stress increasingly applied to the  
18 pressure-sensitive element by screwing the glow plug into the plug hole and  
19 increased with increase in the combustion pressure.

1    10.    A glow plug according to Claim 9, wherein the pressure-sensitive  
2    element is ring-shaped and has an inner diameter smaller than an inner diameter  
3    of the threaded portion of the housing.